



United States
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Forest
Service

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Draft Environmental Impact Statement

North and West Big Hole Allotment Management Plans

Wisdom and Wise River Ranger Districts, Beaverhead-Deerlodge National Forest
Beaverhead and Anaconda-Deerlodge Counties, Montana



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**North and West Big Hole Allotment Management Plans
Draft Environmental Impact Statement
Beaverhead and Anaconda-Deerlodge Counties, Montana**

Lead Agency:	USDA Forest Service
Cooperating Agencies:	Bureau of Land Management (BLM) Butte and Dillon Field Offices, Montana Fish, Wildlife, and Parks (FWP) Butte Office
Responsible Official:	Russell B. Riebe, Wisdom and Wise River District Ranger, Wisdom Ranger District, P.O. Box 238 Wisdom, MT 59761
For Information Contact:	Kevin Greenwood, District Range Management Specialist P.O. Box 238 Wisdom, MT 59761 406-689-3243, kgreenwood@fs.fed.us

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Chapter 4 – Cooperators, Consultation/Coordination, and Preparers

The following tables identify the Cooperators on this project, tribes, agencies, and individuals Consulted/Coordinated with, and the Forest Service Interdisciplinary (ID) Team members. This chapter also provides the References used, a list of terms used, (in the Glossary), and an Index.

Cooperators

Table 1: Project Cooperators	
Title	Group or Agency
Field Office Manager	Bureau of Land Management (BLM) Butte Office
Supervisory Natural Resource Specialist	Bureau of Land Management (BLM) Dillon Office
Region 3 Supervisor	Fish, Wildlife and Parks, State of Montana, Mount Haggin Wildlife Refuge

Agencies and Individuals Consulted/Coordinated With

Table 2: Agencies and Individuals Consulted/Coordinated With		
Title	Agency, Nation, Group, or Individual	Area of Specialty for this Project
Wildlife Biologist	United States Department of Interior, Fish and Wildlife Service	Threatened and Endangered Species, Wildlife
Fish Biologist	United States Department of Interior, Fish and Wildlife Service	Threatened and Endangered Species, Plants
Wildlife Biologists	Montana Fish, Wildlife, and Parks, Region 3 Butte Field Office	Terrestrial Wildlife
Refuge Manager	Mount Haggin Wildlife Refuge	Refuge Management

Table 2: Agencies and Individuals Consulted/Coordinated With		
Title	Agency, Nation, Group, or Individual	Area of Specialty for this Project
Range Managers	USDI Bureau of Land Management, Montana Butte District Office	Range Management
Range Managers	USDI Bureau of Land Management, Montana Dillon Field Office	Range Management
Tribal Historic Preservation Officer	Confederated Salish-Kootenai Nation	Tribal Relations
Tribal Historic Preservation Officer	Black Foot Tribe	Tribal Relations
Cultural Program Manager	Shoshone-Bannock Tribe	Tribal Relations
Existing 11 domestic grazing permit holders	Individual	Permittee
Aquatic Resource Manager, Beaverhead-Deerlodge National Forest	United States Department of Agriculture, Forest Service	Aquatics
Environmental Coordinator, Beaverhead-Deerlodge National Forest	United States Department of Agriculture, Forest Service	National Environmental Policy Act, Recreation
Wildlife Program Manager, Beaverhead-Deerlodge National Forest	United States Department of Agriculture, Forest Service	Wildlife
Planning, Budget, and Resources Staff Officer, Beaverhead-Deerlodge National Forest	United States Department of Agriculture, Forest Service	Planning and Budget

Interdisciplinary Team Members

Table 3: Interdisciplinary Team Members		
Name	Title	Area Of Specialty for this Project
Daniel Downing	Wise River/Wisdom District Aquatics Specialist	Aquatics
Pam Fletcher	Planner	Soils
Nathan Gassmann	Wise River/Wisdom/Dillon Districts Recreation Specialist	Wilderness, Inventoried Roadless Areas, Recreation
Kevin Greenwood	Wise River/Wisdom District Range Specialists	Range and Weeds
Laura Hudnell	Interdisciplinary (ID) Team Leader	ID Team Leader
Steven Kujala	Geographic Information System (GIS) Specialist	GIS
Ryan Powel	South Zone Archeologist	Heritage/Cultural Resources
Russell Riebe	Wisdom/Wise River District Ranger	District Ranger/Line Officer/Decision Maker
Jenna M. Roose	South Zone Wildlife Biologist	Wildlife Biologist
Dave Ruppert	Forest Soil Scientist	Soil
Jessie Salix	Forest Botanist	Botany/Sensitive Plants
Keith Stockmann	Regional Economist	Social/Economics
Kevin D. Weiner	Forest Hydrologist	Hydrology
Douglas Wright	Forest Landscape Architect	Scenery

Distribution of the Draft Environmental Impact Statement

This Draft Environmental Impact Statement (DEIS) has been distributed to individuals who commented during the scoping period and those who specifically requested a copy of the document. In addition copies have been sent to the following Federal agencies, federally recognized tribes, state, and local governments, and organizations. These groups and individuals represent a wide range of views regarding the updating of grazing management and infrastructure on eleven domestic grazing allotments (Seymour, Fishtrap, Mudd Creek, Pintlar Creek, Mussigbrod, Ruby Creek, Dry Creek, Twin Lakes, Monument, Pioneer, and Saginaw) to comply with the applicable 2009 Beaverhead-Deerlodge Land and Resource Management Plan (Forest Plan) direction.

Table 4: DEIS Distribution List

Name	Title	Agency, Tribal, Organization, or Individual Affiliation
	Field Office Manager	Bureau of Land Management (BLM) Butte Office
Patricia Fosse	Supervisory Natural Resource Specialists	Bureau of Land Management (BLM) Dillon Office
Pat Flowers	Region 3 Supervisor, Commenter	Fish, Wildlife and Parks, State of Montana, Mount Haggin Wildlife Refuge
Suzanne Bohan	Region 8 Headquarters	United States Environmental Protection Agency
Julia A. DalSoglio	EPA Region 8 Montana, Commenter	United States Environmental Protection Agency, Region 8, Montana Office
Robert Ray	Director Montana DEQ	Montana Department of Environmental Quality
Nathan Small	Chairman Ft. Hall Business Council	Shoshone-Bannock Tribes
Carolyn Boyer-Smith	Cultural Resources Coordinator	Shoshone-Bannock Tribes
Yvette Tuell	Environmental Program Manager	Shoshone-Bannock Tribes
	BVHD County Commissioner	BVHD County Commissioner
	BVHD County Planner	BVHD County Planning
	AD County Commissioner	Anaconda-Deerlodge County Commissioner
	Weed Coordinator	Fish, Wildlife and Parks, State of Montana,
Jim Olson	Region 3 Fish Biologist, Commenter	Fish, Wildlife and Parks, State of Montana,

Table 4: DEIS Distribution List

Name	Title	Agency, Tribal, Organization, or Individual Affiliation
Vanna Boccadori	Wildlife Biologist	Fish, Wildlife and Parks, State of Montana,
Michael T. Garrity	President, Commenter	Alliance for the Wild Rockies
Sara Johnson	President, Commenter	Native Ecosystem Council
Vince Colucci	Commenter	Individual
Harry and Hans Humbert	Commenter, permittee	Dell Bacon Ranch
Heidi Hirschy	Commenter, permittee	Dick Hirschy Cattle Co.
	Chair	BVHD County Conservation District
Tim Egan		Dept. Natural Resource Conservation
Kyle Tackett		USDA Natural Resource Conservation Service
Ingrid Drieling	Rangeland Management Specialist	USDA Salmon-Challis NF
Andrew Gorder	Staff Attorney	Cottonwood Environmental Law Center
Nancy Schultz	Commenter	Gallatin Wilderness Assoc.
	Division Administrator	Montana HAD-MT
	Deputy Director	APHIS PPD/EAD
	National Environmental Coordinator	USDA Natural Resource Conservation Service
	Director, Planning and Review	Advisory Council on Historic Preservation
	Acquisitions & Serials Branch	National Agricultural Library
	Northwestern Division	U.S. Army Corps of Engineers
	Energy and Environmental Readiness Division	Chief of Naval Operations (N45)
	Director	OEPC
	Director	Northwest Power Planning Council
	Environmental Impact Branch G-MEP	U.S. Coast Guard
	Regional Director, Northwest Mountain Region	Federal Aviation Administration
	Director, NEPA Policy & Compliance, DOE	DOE
Kim Kajin	Permittee	Individual
Kim Bacon	Permittee	Individual
David Buck	Permittee	Individual

Table 4: DEIS Distribution List

Name	Title	Agency, Tribal, Organization, or Individual Affiliation
John L. Lewis	Permittee	Individual
Clyde Thompson	Permittee	Individual
Philip and Sarah Ralston	Permittee	Individual
Ernest K. Bacon, LP	Permittee	Individual
Barbara Gibbons	Permittee	Torrey MT Ranch Lands Assoc.
Lee and Lurene Kirkpatrick	Permittee	Individual
Dean Stanchfield	Permittee	Stanchfield Cattle Co.
Don & Liz Jones, W.R.S.A	Permittee	Rafter Ranch, Inc.
Harold D. Peterson	Permittee	Peterson Bros. Cattle Co.
	Permittee	Johnson Brothers, Inc
	Permittee	Jackson Ranches
Lary Krizan and Jackpine Savages	Permittee	Individual
	Permittee	Jack Heirchy Livestock, Inc.
	Permittee	Husted Ranches, Inc.
Clayton Huntley	Permittee	Huntley & Son Inc. HCR
Robert A. James	Permittee	Horse Prairie Livestock L.P.
Dennis and Bruce Bacon	Permittee	HJB Ranch, LLC
	Permittee	Foster Land & Cattle Co.
MD Peterson	Permittee	Forty Bar Ranch, Inc.
DJ Smith	Permittee	Individual
Jay Lyndes	Permittee	Arrow Ranches, LLC
Sharon & Ed Stede	Permittee	Big Hole Petroleum
Robert J. Wueste, LLC	Permittee	Individual
	Permittee	Dick Heirchy Cattle Co.
William Bigday	Tribal Preservation Officer Cultural & Burial Preservation	Crow Tribe
Carl Venne	Chairman	Crow Tribe
	Tribal Preservation Office	Easter Shoshone Tribe
Ivan Posey	Chairman– Business Council	Easter Shoshone Tribe
Earl Old Person	Chairman Blackfeet Tribal Business Council	Blackfeet Tribe
John Murray	Tribal Historic Preservation Officer Blackfeet Planning and Development	Blackfeet Tribe
Josiah Pinkham	Tribal Archaeologist	Nez Perce Tribe
Samuel L Penney	Chairman, Nez Perce Tribal	Nez Perce Tribe

Table 4: DEIS Distribution List

Name	Title	Agency, Tribal, Organization, or Individual Affiliation
	Executive Committee	
Keith “Pat” Baird	Tribal Historic Preservation Officer	Nez Perce Tribe
E.T. “Bud” Moran	Chairman Tribal Council	Confederated Salish and Kootenai Tribes
Ira Matt	Tribal Historic Preservation Officer	Confederated Salish and Kootenai
Jen Downing		Big Hole Watershed Committee

References Cited

Social and Economic:

American Farmland Trust. 2002. "Strategic Ranchland in the Rocky Mountain West." Rocky Mountain Projects. http://www.farmland.org/rocky_mountain/strategic_ranchlands1.htm

Headwaters Economics. 2013. Economics Profile System – Human Dimensions Toolkit (EPS-HDT). <http://headwaterseconomics.org/tools/eps-hdt>

Larson, Joel. 2012. Revised BLM Grazing Impacts Methodology (unpublished)

Gebert, Krista M.; Odell, Susan L. 2007. A descriptive analysis of change in eligibility status for the USDA Forest Service Economic Recovery Program. Research Paper RMRS-RP-62WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 32 p.

Montana Department of Fish, Wildlife and Parks. Draft Environmental Assessment: Mount Haggin WMA-South Grazing Lease Renewal. February 2011. MEPA, NEPA, MCA 23-1-110. [Fwp.mt.gov/fwpdoc.html?id=48584](http://fwp.mt.gov/fwpdoc.html?id=48584), Page 21

Northern Economics 2002. Social Assessment of the Beaverhead-Deer Lodge National Forest.

Fletcher, 1960: *in* Northern Economics 2002.

Harrison 1957; *in* Northern Economics 2002.

Malone, Roeder, and Lang, 1991: *in* Northern Economics 2002.

Taylor 2003; *in* Northern Economics 2002.

US Department of Agriculture. 1997. Departmental Regulation No. 5600-002, Environmental Justice, December 15, 1997, DR5600-002, <http://www.ocio.usda.gov/sites/default/files/docs/2012/DR5600-002.pdf>

US Department of Agriculture. National Agricultural Statistical Service, January 2007 Inventory. (<http://www.agcensus.usda.gov/Publications/2002/index.php>)

US Department of Agriculture . 2007 Census of Agriculture. Table 62 - Summary by NAICS Industry. http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_US/

US Department of Agriculture. National Agricultural Statistical Service, January 2002 Inventory. (<http://www.agcensus.usda.gov/Publications/2002/index.php>)

US Department of Commerce. 2012. Census Bureau, American Community Survey Office. Washington, D.C. <https://www.census.gov/acs/www/>

US Department of Commerce. Bureau of Economic Analysis, REIS 2012, Table CA30, <http://www.bea.gov/regional/>

US Department of Commerce. Bureau of Economic Analysis, REIS 2012, Table CA25, <http://www.bea.gov/regional/>

US Department of Commerce (Bureau of Economic Analysis, REIS 2012, Table 25N, <http://www.bea.gov/regional/>

U.S. Department of Commerce (2012. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Tables CA05 & CA05N, <http://www.bea.gov/regional/>

U.S. Department of Labor. 2012. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C, <http://www.bls.gov/cew/>

U.S. Department of Labor. 2012. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C. <http://www.bls.gov/cew/>

U.S. Department of Interior. 2009. Payments in Lieu of Taxes (PILT), Washington D.C.; U.S. Department of Agriculture. 2009. Forest Service, Washington, D.C

US Environmental Protection Agency, Environmental Justice Webpage. www.epa.gov/environmentaljustice/ Accessed July 10, 2013.

US Environmental Protection Agency. 2010. Action Development Process: Interim Guide on Considering Environmental Justice During the Development of an Action, p. 3, <http://www.epa.gov/environmentaljustice/resources/policy/considering-ej-in-rulemaking-guide-07-2010.pdf>

Heritage:

USDA Forest Service. 1995b. Programmatic Agreement Among the U.S. Department of Agriculture, Forest Service Northern Region (Montana), the Advisory Council on Historic Preservation and, the Montana State Historic Preservation Officer Regarding Cultural Resources Management on National Forests in the State of Montana. USDA, Forest Service, Beaverhead national Forest, Dillon, MT, May, 1995..

USDA Forest Service, 2008a. Beaverhead-Deerlodge National Forest Land and Resource Management Plan, FEIS. USDA, Forest Service, Beaverhead National Forest, Dillon, MT. December, 2008.

USDA Forest Service. 2008b. FSM 2300 Amendment– Recreation, Heritage, and Volunteer resources Chapter 2360 – Heritage Program Management. Forest Service National Headquarters, Washington, D.C.

USDA Forest Service. 2009. Beaverhead-Deerlodge National Forest – Land and Resource Management Plan. Report on File Beaverhead-Deerlodge National Forest. Dillon, Montana. January, 2009.

Recreation, Wilderness, and Roadless:

Nothing at this time.

Scenery:

State of Montana Fish, Wildlife, and Parks. 1980. Mount Haggin Interim Management Plan. State of Montana Fish, Wildlife, and Parks. Butte, MT.

USDA Forest Service. 2009. Beaverhead-Deerlodge National Forest Land and Resource Management Plan. Beaverhead-Deerlodge National Forest. Dillon, MT.

USDA, Forest Service. 1995. Landscape Aesthetics: A Handbook for Scenery Management. Agriculture Handbook No. 701. Washington D.C.

USDI, Bureau of Land Management. 2009. Record of Decision and Approved Butte Resource Management Plan. Butte Field Office. Butte, MT.

USDI, Bureau of Land Management. 2006. Record of Decision and Approved Dillon Resource Management Plan. Dillon Field Office. Dillon, MT.

Range and Invasive Plants:

Hansen, P.L., R.D. Pfister, K. Boggs, B.J. Cook, J. Joy, and D.K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Misc. Pub. No. 54, Missoula, MT: The University of Montana, School of Forestry, Montana Forest and Conservation Experiment Station. 646 p.

Montana Department of Fish, Wildlife and Parks. 2011. Draft environmental assessment for Mount Haggin WMA-south grazing lease renewal. On file at Butte, MT: Montana Dept. Fish, Wildlife and Parks, Region 3, Butte Field Office. 21 p.

Muegglar, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. Gen. Tech. Rep. INT-66, Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 154 p.

O'Brien, R. A., C.M Johnson, A.M. Wilson, and V.C. Elsbernd. 2003. Indicators of rangeland health and functionality in the Intermountain West. Gen. Tech. Rep. RMRS-GTR-104, Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 13 p.

- Ortega, Y.K. and D.E. Pearson. 2005. Weak vs. strong invaders of natural plant communities: assessing invasibility and impact. *Ecological Applications*, 15(2):651-661.
- Stoddart, L. A., A.D. Smith, and T.W. Box. 1975. *Range Management*. McGraw-Hill series in forest resources. McGraw-Hill Book Company, New York, NY. 532 p.
- U.S. Department of Agriculture, Forest Service. 2002. Final environmental impact statement and record of decision for Beaverhead-Deerlodge National Forest noxious weed control. On file at Dillon, MT: U.S. Department of Agriculture, Forest Service, Beaverhead-Deerlodge National Forest.
- U.S. Department of Agriculture, Forest Service. 2003. Rangeland suitability for livestock grazing at the Forest Plan level and standards for NEPA display. Misc. pub. on file at Dillon, MT: U.S. Department of Agriculture, Forest Service, Beaverhead-Deerlodge National Forest. 16 p.
- U.S. Department of Agriculture, Forest Service. 2010. Livestock grazing effectiveness monitoring for riparian areas on the Beaverhead-Deerlodge National Forest: Vegetation parameters sampling protocol. Misc. Pub. On file at Dillon, MT: U.S. Department of Agriculture, Forest Service, Beaverhead-Deerlodge National Forest. 9 p.
- U.S. Department of the Interior, Bureau of Land Management. 1996. Sampling vegetation attributes. Interagency Technical Reference, Denver CO: U.S. Department of the Interior, Bureau of Land Management, National Applied Resource Sciences Center. 163 p.
- U.S. Department of the Interior, Bureau of Land Management. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6, Denver CO: U.S. Department of the Interior, Bureau of Land Management Service Center. 118 p.
- U.S. Department of the Interior, Bureau of Land Management. 2009. Upper Big Hole watershed assessment report. Dillon, MT: U.S. Department of the Interior, Bureau of Land Management, Dillon Field Office. 55 p.

Sensitive Plants:

- Ahlenslager K., and L. Potash. 2007. Conservation Assessment for 13 Species of Moonworts (*Botrychium* Swartz Subgenus *Botrychium*). Unpublished Report. USDA Forest Service, Region 6 and USDI Bureau of Land Management, Oregon and Washington. 57 pp.
- Anderson, V. J. and R. M. Thompson. 1993. Chemical and Mechanical Control of False Hellebore (*Veratrum californicum*) in an Alpine Community. USDA Forest Service. Intermountain Research Station. Research Paper INT-469.
- Barton, D. and S. Mincemoyer. 2012. Personal Communication: *Botrychium crenulatum* specimen identification verification, October 2012.

- Beatty, B.L., W.F. Jennings, and R.C. Rawlinson (2003, November 12). *Botrychium ascendens* W.H. Wagner (Trianglelobe moonwort), *B. crenulatum* W.H. Wagner (scalloped moonwort), and *B. lineare* W.H. Wagner (narrowleaf grapefern): a technical conservation assessment. [online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/botrychiums.pdf> [accessed October 24, 2012].
- Belsky, A. J and D. M. Blumenthal. 1997. Effects of Livestock Grazing on Stand Dynamics and Soils in Upland Forest of the Interior West. *Conservation Biology*. Vol. 11, No. 2. Pp. 315-327.
- Brown, S.R, and J. A. Barber. 2012. Beaverhead-Deerlodge National Forest Existing Vegetation Database (VMap) Version 12. <http://www.fs.usda.gov/goto/r1/VMap>
- Cosgriff, R., V.J. Anderson and S. Monson. 2004. Restoration of Communities Dominated by False Hellebore. *Journal of Range Management* 54: 4, pgs 365-370.
- DeBenedetti, S. H., and D. J. Parsons. 1984. Post fire Succession in a Sierran Subalpine Meadow. *American Midland Naturalist*. Vol. 111, No. 1, pp. 188-125.
- Dorn, R. D. 1984. *Vascular Plants of Montana*. Mountain West Publishing. 276 pp.
- Douglas, D. 1981. The Balance between Vegetative and Secual Reproduction of *Mimulus Primuloides* (Scrophulariaceae) at Different Altitudes in California. *Journal of Ecology*, Vol. 69, No. 1, pp. 295-310.
- Dunwiddie, P. W. 1977. Recent Tree Invasion of Subalpine Meadows in the Wind River Mountains, Wyoming. *Arctic and Alpine Research*, Vol. 9, No. 4 (Nov., 1977), pp. 393-399
- Elzinga, C. 1997. Habitat conservation assessment and conservation strategy - Lemhi penstemon (*Penstemon lemhiensis*). USDA Forest Service and USDI Bureau of Land Management. 46 pp. + app.
- Farrar, D. 2006. Review of National Forest Region 6 conservation assessment for *Botrychium*, February 28, 2006. Unpublished memorandum to Kathy Ahlenslager, Iowa State University, Ames, IA. 6pp.
- Greenwood, Kevin. 2013. Personal communication through e-mail dated 9.19.2013. Titled: Re: WBP use in the south allotments.
- Greenwood, Kevin. 2013. Personal communication through e-mail dated 9.19.2013. Titled: Re: Personal Communications.
- Greenwood, Kevin. 2012. Personal communication through e-mail dated 10.12.2012. Titled: Re: Hall's rush campground fence.

- Greenwood, Kevin. 2012. Personal communication through e-mail dated 10.12.2012. Titled: Re: Upper Hamby Creek.
- Greenwood, Kevin. 2013. Personal communication through e-mail dated 10.05.2013. Titled: Re: Twin Lake Campground
- Heidel, B., and J.S. Shelly. 2001. The Effects of Fire On Lemhi Penstemon (*Penstemon lemhiensis*) - Final Monitoring Report, 1995-2000. Report to the Beaverhead-Deerlodge National Forest and the Dillon Field Office – Bureau of Land Management. Montana Natural Heritage Program, Helena. 22 pp. plus appendices.
- Hobbs, R. J., and I. F. Huenneke. 1992. Disturbance, Diversity, and Invasion: Implications for Conservation. Volume 6, No. 3. Pp. 324-337
- Jacobs, J. S., and R. L. Sheley. 1999. Grass defoliation intensity, frequency, and season effects on spotted knapweed invasion. Journal of Range Management. 52: 626-632.
- Johnson-Groh, C. 1997. Field surveys for *Botrychium gallicomontanum* and phenology of *Botrychium mormo* in Minnesota. Unpubl. Rept.
- Johnson-Groh, C., Riedel, C., Schoessler, L., & Skogen, K. 2002. Belowground distribution and abundance of *Botrychium* gametophytes and juvenile sporophytes. American Fern Journal, 92(2), 80-92.
- Johnson-Groh, C. L., and D. R. Farrar. 1996. The effects of fire on prairie moonworts (*Botrychium* subgenus *Botrychium*). American Journal of Botany. 83:134. (Abstract).
- Johnson, C. G. Jr. 1990. Proceedings – Symposium on Whitebark Pine Ecosystems: Ecology and Management of a High-Mountain Resource. Response of Vegetation to Livestock Impacts on Green Fescue Sites in the Whitebark Pine Ecosystem. Bozeman, MT. March 29-31, 1989.
- Keane, R.E. and R.A. Parsons. 2010. Restoring Whitebark Pine Forests of the Northern Rocky Mountains, USA. Ecological Restoration. Vol. 28, No. 1. Pgs 56-70.
- Lacey, J. P. Husby and G. Handi. 1990. Observations on Spotted and Diffuse Knapweed Invasion into Ungrazed Bunchgrass Communities in Western Montana. Rangelands. Vol. 12, No. 1. Pp. 30-32
- Lackschewitz, K. 1991. Vascular Plants of West-Central Montana-Identification Guidebook. Intermountain Research Station. 648 pp.
- Landsberg, J. and G. Crowley. 2004. Monitoring rangeland biodiversity: Plants as indicators. Austral Ecology 29, 59-77.

- Lesica, P. 1989. Conservation status of CAREX PARRYANA ssp. IDAHOA in Montana. Unpublished report to Bureau of Land Management. Montana Natural Heritage Program, Helena. 32 pp. plus appendices
- Lesica, P. 2012. Manual of Montana Vascular Plants. BRIT Press. Fort Worth, TX. 771 pp.
- Loft, E. R., J. W. Menke, J. G. Kie, and R. C. Bertram. 1987. Influence of Cattle Stocking Rate on the Structural Profile of Deer Hiding Cover. The Journal of Wildlife Management. Vol. 51, No. 3. Pp. 655 – 664.
- MNHP - 2011. GIS Data of sensitive plants acquired through the Montana Natural Heritage Program.
- MNHP - 2013. GIS Data of sensitive plants acquired through the Montana Natural Heritage Program.
- MNHP - California False-hellebore — *Veratrum californicum*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on October 25, 2012, from http://FieldGuide.mt.gov/detail_PMLIL25020.aspx
- MNHP - English Sundew — *Drosera anglica*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on November 29, 2012, from http://FieldGuide.mt.gov/detail_PDDRO02010.aspx
- MNHP - Hall's Rush — *Juncus hallii*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on October 22, 2012, from http://FieldGuide.mt.gov/detail_PMJUN011E0.aspx
- MNHP - Hiker's Gentian — *Gentianopsis simplex*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on October 22, 2012, from http://FieldGuide.mt.gov/detail_PDGEN080A0.aspx
- MNHP - Idaho Sedge — *Carex idahoensis*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on November 29, 2012, from http://FieldGuide.mt.gov/detail_PMCYP036E0.aspx
- MNHP - Lemhi Beardtongue — *Penstemon lemhiensis*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on October 22, 2012, from http://FieldGuide.mt.gov/detail_PDSCR1L3N0.aspx
- MNHP - Primrose Monkey-flower — *Mimulus primuloides*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on October 22, 2012, from http://FieldGuide.mt.gov/detail_PDSCR1B270.aspx

- MNHP - Wavy Moonwort — *Botrychium crenulatum*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on October 22, 2012, from http://FieldGuide.mt.gov/detail_PPOPH010L0.aspx
- MNHP - Whitebark Pine — *Pinus albicaulis*. Montana Field Guide. Montana Natural Heritage Program. Retrieved on October 22, 2012, from http://FieldGuide.mt.gov/detail_PGPIN04010.aspx
- Moseley, R.K., M. Mancuso, and J. Hilty. 1990. Field Investigation and Status Survey of *Penstemon lemhiensis* in Idaho. Unpublished Report. Idaho Department of Fish and Game, Conservation Data Center, Boise. 17 pp.
- Ortega, Y. K. and D. E. Pearson. 2005. Weak vs. Strong Invaders of Natural Plant Communities: Assessing Invasibility and Impact. Ecological Applications. Vol. 15, No. 2. Pp. 651-661.
- Panter, K. E., R. F. Keeler, L. F. James, and T. D. Bunch. 1992. Impact of Plant Toxins on Fetal and Neonatal Development: A Review. Journal of Range Management. Vol. 45, No. 1. Pp. 52-57.
- Schassberger, L. A. 1991. Rare Plant Inventory of the East Pioneer Mountains. Prepared for the USDA Forest Service, Region 1, Beaverhead National Forest. Montana Natural Heritage Program, Helena, MT. 55 pp
- Schwandt, J. 2006. Whitebark Pine In Peril: A Case for Restoration. USDA Forest Service: R1-06-28.
- Sheley, R. L., J. S. Jacobs, and M. F. Carpinelli. 1998. Distribution, Biology, and Management of Diffuse knapweed (*Centaurea diffusa*) and Spotted Knapweed (*Centaurea maculosa*). Weed technology. Vol. 12: 353-362.
- Shelly, J. S. 1990. Status Review Update and Establishment of Demographic Monitoring Studies: *Penstemon lemhiensis*. Report to the Beaverhead-Deerlodge and Bitterroot National Forests, Montana. 53 pp. plus appendix.
- Stucki, D. S., T. J. Rodhouse, J. W. Lyon, L. K. Garrett. Natural Resource Conservation in a Cultural Park: Evaluating the Importance of Big Hole National Battlefield to the Endemic Lemhi Penstemon (*Penstemon lemhiensis*). Natural Areas Journal. 33: 50-58.
- Tomback, Diana F., Stephen F. Arno, and Robert E. Keane. "The compelling case for management intervention." Whitebark pine communities: ecology and restoration. Island Press, Washington, DC (2001): 3-25.
- USDA, Forest Service. 1988. Fences. Pub. 2400-Range, 8824 2803. [Location of publisher unknown]: U.S. Department of the Interior, Bureau of Land Management; U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 210 p. Available from: Society for Range Management, 1839 York Street, Denver, CO 80206.

- USDA, Forest Service. 2002. Beaverhead-Deerlodge Noxious Weed Control Record of Decision.
- USDA, Forest Service. 2005. Forest Service Manual 2600 - Wildlife, Fish, and Sensitive Plant Habitat Management; Chapter 2670 - Threatened, Endangered and Sensitive Plants and Animals. Amendment No.: 2600-2005-1. 22 pps.
- USDA Forest Service. 2009a. Beaverhead-Deerlodge National Forest Revised Forest Plan.
- USDA, Forest Service. 2010a. Executive Summary: Status and Conservation of Whitebark Pine. USDA Forest Service, Region 1.
- USDA, Forest Service. 2010b. Beaverhead-Deerlodge NF Whitebark Pine Monitoring. Unpublished.
- USDA Forest Service. 2012. INTERIM CONSERVATION RECOMMENDATIONS FOR GREATER SAGE-GROUSE AND GREATER SAGE-GROUSE HABITAT. USFS Regions 1, 2, and 4. File Code 2670. USDA, Forest Service, Wash. D.C. 11pp. USDI, Fish and Wildlife Service. 2011a. Endangered and threatened wildlife and plants; 12-month finding (2011a) (2011a) on a petition to list *Pinus albicaulis* as Endangered or Threatened with critical habitat. Federal Register, 76(138), 42631-42654.
- USDI, Fish and Wildlife Service. 2011b. Candidate Species: Section 4 of the Endangered Species Act. http://www.fws.gov/endangered/esa-library/pdf/candidate_species.pdf
- Vanderhorst, J. 1997. Conservation Assessment of Sensitive Moonworts (Ophioglossaceae: *Botrychium* subgenus *Botrychium*) on the Kootenai National Forest. Report to the Kootenai National Forest, Montana. 83 pp. plus appendix.
- Vavra, M., C.G. Parks, M.J. Wisdom. 2007. Biodiversity, exotic plant species, and herbivory: The good, the bad and the ungulate. *Forest Ecology and Management* 246. 66-72.
- Willard, E. E. 1990. Proceedings – Symposium on Whitebark Pine Ecosystems: Ecology and Management of a High-Mountain Resource. Use and Impact of Domestic livestock in Whitebark Pine Forests. Bozeman, MT. March 29-31, 1989.
- Zika, P.F., R. Brainerd, and B. Newhouse. 1995. Grapeferns and Moonworts (*Botrychium*, Ophioglossaceae) in the Columbia Basin. A Report submitted to the Eastside Ecosystem Management Project, US Forest Service, Walla Walla, Washington. 116 pps.

Soil:

- Busby, F. E. and G.F. Gifford. 1981. Effects of Livestock Grazing on Infiltration and Erosion Rates Measured on Chained and Unchained Pinyon-Juniper sites in Southeastern Utah. *Journal of Range Management* 34 (5):400-405

- Cannon, M.E. and G.A.Nielsen. 1984. Estimating Production of Range Vegetation from Easily Measured Soil Characteristics. *Soil Science Society of America Journal*. 48 (6):1393-1397.
- Caudle, Dan et al. 2010. Interagency Ecological Site Description - Handbook for Rangelands (Draft). Washington Office, USDA Forest Service, Washington D.C.
- Cleland, D.T.; Avers, P.E.; McNab, W.H.; Jensen, M.E.; Bailey, R.G., King, T.; Russell, W.E. 1997. National Hierarchical Framework of Ecological Units. Published in, Boyce, M. S.; Haney, A., ed. 1997. *Ecosystem Management Applications for Sustainable Forest and Wildlife Resources*. Yale University Press, New Haven, CT. pp. 181-200.
- Dadkhah, M. and G.F. Gifford. 1980. Influence of vegetation, rock cover, and trampling on infiltration rates and sediment production. *Water Resources Bull.* 16:979-986.
- Devaurs, M. and G.F. Gifford. 1984. Variability of Infiltration within Large Runoff Plots on Rangelands. *Journal of Range Management* 37(6): 523-528.
- Greenwood, K. 2013. Range Specialist Report for North and West Big Hole Allotment Management Plans Project. On File at Wisdom Ranger District, Wisdom, Montana.
- Ganjugunte, G.K., G.F. Vance, C.M. Preston, G.E. Schuman, L.J. Ingram, P.D. Stahl, and J.M. Welker. 2005. Soil organic carbon composition in a northern mixed-grass prairie: effects of grazing. *Soil Sci. Soc. Am. J.* 69:1746-1756.
- Hamilton, E.W. III, D.A. Frank, P.M. Hinchey, and T. R. Murray. 2008. Defoliation induces root exudation and triggers positive rhizospheric feedbacks in a temperate grassland. *Soil Biology and Biochemistry* 40 (11): 2865-2873.
- Heady, H. F. 1994. Summary: Ecological Implications of Livestock Herbivory in the West. In: Vavra, M. W.A. Laylock, and R.D. Pieper, Eds. *Ecological Implications of Livestock Herbivory in the West*. Society for Range Management, Denver, CO.
- Herrick, Jeffrey E., Justin W. Van Zee, Kris M. Havstad, Laura M. Burkett and Walter G. Whitford. 2009. *Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems*.
- Hole F.D. and G.A. Nielsen. 1968. Soil Genesis Under Prairie. P 28-34. In Peter Schramm (ed.) *Proc. Symp. On Prairie and Prairie Restoration*. Spec. Pub. E. Knox College Field Station, Galesburg, IL.
- Johnson, M.G., E.R. Levine and J.S. Kern. 1994. Soil Organic Matter Distribution, Genesis, and Management to Reduce Greenhouse Gas Emissions. *Water, Air and Soil Pollution* 82: 593-615.
- Lewis, R.S. 1998. Geologic Map of the Butte 1° x 2° Quadrangle, South-Western Montana. Montana Bureau of Mines and Geology Open File Report MBMG 363. Butte, Montana.
- Munn, L.C., G.A. Nielsen and W.F. Mueggler. 1978. Relationships of Soils to Mountain and Foothill Range Habitat Types and Production in Western Montana. *SOIL SCI. SOC. AM. J., VOL.* 42: 135-139.

Packer, P.E. 1963. Soil stability requirement for the Gallatin elk winter range. *J. Wildlife Manage.* 27:401-410.

Pellant, M. P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6. U.S. Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, CO. BLM/WE/ST-00/001+1734/REV05. 122pp.

Robichaud, P.R., J.L. Beyers and D.G. Neary. 2000. Evaluating the effectiveness of postfire rehabilitation treatments. USDA, USFS, Gen. Tech. Rep. RMRS-GTR-63. 84 p.

Ruppel, E.T., J.M. O'Neill and D.A. Lopez. 1993. Geologic Map of the Dillon 1° x 2° Quadrangle, Idaho and Montana. Miscellaneous Investigation Series. Map 1-1803-H. U.S. Geological Survey.

Ruppert, D.A. and P.S. Fletcher. 2010. Beaverhead-Deerlodge National Forest Soil Interpretation Methodology: Erosion, Mass Wasting, Rutting and Compaction Risk Ratings. On file at Butte Ranger District/SO Annex Butte, Montana.

Schuman, G.E., J.D. Reeder, J.T. Manley, R.H. Hart, and W.A. Manley. 1999. Impact of grazing management on the carbon and nitrogen balance of a mixed-grass rangeland. *Ecol. Appl.* 9:65–71.

Stoddart, L.A., A.D. Smith, and T. W. Box. 1975. Range Management. Third Edition. McGraw-Hill Book Company, New York, NY.

USDA Forest Service. 1999. Forest Service Manual, R-1 Supplement 2500-99-1. Soil Management, Soil Quality Monitoring. Missoula, MT. 6pp.

Beaverhead-Deerlodge National Forest Noxious Weed Control FEIS (USDA Forest Service, 2002

Winthers, E.; Fallon, D.; Haglund, J.; DeMeo, T.; Nowacki, G.; Tart, D.; Ferwerda, M.; Robertson, G.; Gallegos, A.; Rorick, A.; Cleland, D. T.; Robbie, W. 2005. Terrestrial Ecological Unit Inventory technical guide. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office, Ecosystem Management Coordination Staff. 245 p

Wood, M.K., and W.H. Blackburn. 1984. Vegetation and soil responses to cattle grazing systems in the Texas rolling plains. *J. Range Manage.* 37:303-308.

Hydrology:

Bohn, Brice. The Effectiveness of Allowable Use Levels in Recovering Streams Affected by Livestock. Internal Forest Service document. June, 2004

Grant, et. al. Effects of Forest Practices on Peak Flows and Consequent Channel Response: A State-of-Science Report for Western Oregon and Washington. May, 2008

Lundquist, Jessica and Flint, Alan. Onset of Snowmelt and Streamflow in 2004 in the Western United States: How Shading May Affect Spring Streamflow Timing in a Warmer World. December, 2006.

Pfankuch, Dale J. 1975. *Stream Reach Inventory and Channel Stability Evaluation*. USDA Forest Service, Northern Region, Missoula, MT. 29p.

Rosgen, Dave L. 2001. *Applied River Morphology, Second Edition*. Printed Median Companies, Minneapolis, Minnesota. 368p.

Rosgen, David L. 1999. *A Stream Channel Stability Assessment Methodology*. Research Paper. 11p.

Rosgen, Dave L. 1996. *Field Survey Procedures for Characterization of River Morphology*. Field Methodology. 8p.

Rosgen, Dave L. 1994. *A Classification of Natural Rivers*. Catena. 22(3): 3-33.

Aquatics:

Brown, C. J. D. 1971. *Fishes of Montana*. Agricultural Experiment Station. Montana State University. Bozeman, MT.

Bauer, G. 1987. Reproductive strategy of the freshwater pearl mussel *Margaritifera margaritifera*. *Journal of Animal Ecology*. 56: 691-704.

Corn, P.S., M. Jennings and E. Muths. 1997. Survey and assessment of amphibian populations in Rocky Mountain National Park. *Northwestern Naturalist* 78:34-55.

Kaya, C. M. 1990. Status Report on Fluvial Arctic Grayling (*Thymallus arcticus*) in Montana. Biology Department. Montana State University. Bozeman, MT.

Maxell, B.A. 2000. Management of Montana's amphibians: a review of risk factors to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history and status and conservation of individual species. Prepared by University of Montana, Wildlife Biology Program, Missoula, MT for the USDA Forest Service, Northern Region, Missoula, MT. 163 pp.

Maxell, B.A. 2004. Report on amphibian and aquatic reptile inventories conducted on and around the Beaverhead-Deerlodge National Forest 2001-2003. Prepared by Bryce A Maxell, Wildlife Biology Program, University of Montana, Missoula, MT for USDA, Forest Service, Missoula & Dillon, MT and Montana Fish, Wildlife and Parks, Missoula, MT and USDI, Bureau of Land Management, Montana State Office, Billings, MT and Montana Department of Environmental Quality, Helena, MT. March 7, 2004. 78 pp.

- MFWP. 2013. Environmental Assessment for Westslope Cutthroat Trout Restoration in Two Small Streams in the Big Hole River Drainage. Montana Fish Wildlife and Parks, Butte.
- Peterson, D. P., B.E. Rieman, M.K. Young, and J.A. Brammer. 2010. Modeling Predicts that Redd Trampling by Cattle Contribute to Population Declines of Native Trout. *Ecological Applications* 20(4): 954-966.
- Reichel, J., and D. Flath. 1995. Identification of Montana's amphibians and reptiles. *Montana Outdoors*. May/June 1995.
- Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, CO.
- Ross, D.A., T.C. Esque, R.A. Fridell, P. Hovingh. 1995. Historical distribution, current status, and a range extension of *Bufo boreas* in Utah. *Herpetological Review* 26(4): 187-189.
- Shepard, B. B., B. E. May, and W. Urie. 2005. Status and conservation of westslope cutthroat trout within the Western United States. *North American Journal of Fisheries Management* 25: 1426- 1440.
- Stagliano, David, M. 2010. Freshwater mussels in Montana: Comprehensive results from 3 years of SWG funded surveys. Report to the Montana Department of Fish, Wildlife and Parks.
- USDA Forest Service. 1995. Decision Notice and Finding of No Significant Impact for the Inland Native Fish Strategy Interim Strategies for Manageing Fish-Producing watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada. USDA, Forest Service, Northern Region, Missoula, MT and Intermountain Region, Ogden, UT and Pacific Northwest Region, Portland, OR. 39 pp.
- USDA Forest Service. 2009. Beaverhead-Deerlodge National Forest Land and Resource Management Plan. January 2009. Beaverhead-Deerlodge National Forest, Dillon, MT.
- USDA Forest Service. 2012. Seymour, Sullivan, and Deep Creeks Watershed Assessment. USDA, Forest Service. Beaverhead-Deerlodge National Forest, Dillon, MT.
- Vannote, R.L. and G.W. Minshall. 1982. Fluvial processes and local lithology controlling abundance, structure, and composition of mussel beds. *Proceedings of the National Academy of Science* 79:4103-4107.

Wildlife:

- Berg, N. 2009. Beaverhead-Deerlodge National Forest Canada Lynx and Snowshoe Hare Habitat and Track Surveys. Greater Yellowstone Lynx Study, Jackson, WY. 22pgs.
- Blanchard, B.M. and R. R. Knight 1991. Movements of Yellowstone Grizzly bears. *Biological Conservation*. 58:41-67
- Bradley, L., J. Gude, N. Lance, K. Laudon, A. Messer, A. Nelson, G. Pauley, M. Ross, T. Smucker, and J. Steuber. 2013. Montana Gray Wolf Conservation and Management 2012 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. Pp 55.
- Connelly, J. W., Schroeder, M. A., Sands, A. R., & Braun, C. E. (2000). Guidelines to manage sage-grouse populations and their habitats. *Journal of Wildlife Management*, 28, 967-985.

- Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.
- Copeland, J.P. and R. E. Yates. 2008. Wolverine Population Assessment in Glacier National Park. USDA Forest Service, Rocky Mountain Research Station, Missoula, MT.
- Copeland, J.P., K.S. McKelvey, K.B. Aubry, A. Landa, J. Persson, R.M. Inman, J. Krebs, E. Lofroth, H. Golden, J.R. Squires, A. Magoun, M.K. Schwartz, J. Wilmot, C.L. Copeland, R.E. Yates, I. Kojola and R. May. 2010. The bioclimatic envelope of the wolverine (*Gulo gulo*): do climatic constraints limit its geographic distribution? *Can. J. Zool.* 88: 233-246.
- Devineau, O., T.M. Schenk, G.C. White, P.F. Doherty, P.M. Lukacs and R.H. Kahn. 2010. Evaluating the Canada lynx reintroduction programme in Colorado: patterns in mortality. *Journal of Applied Ecology.* 47: 524-531.
- Ecosystem Research Group. 2010. Beaverhead-Deerlodge Rapid Assessment. On file at the Supervisors Office.
- Foresman, K. R. 2012. Mammals of Montana. Second Edition. Pp. 111-113. Mountain Press Publishing Company. Missoula, MT
- Fuller, T. K., L. D. Mech, and J. F. Cochrane. 2003. Wolf population dynamics. Pages 161–191 in L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago, Illinois, USA.
- Gevoek, N. 2010. “Grizzlies roaming farther”. *The Montana Standard*. June 17, 2010. http://mtstandard.com/news/local/article_891f7b28-79c7-11df-b313-001cc4c002e0.html . Accessed April 10, 2012.
- Hanauska-Brown, L., L. Bradley, J. Gude, N. Lance, K. Laudon, A. Messer, A. Nelson, M. Ross, and J. Steuber. 2012. Montana Gray Wolf Conservation and Management 2011 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. Pp 54.
- Idaho Department of Fish and Game and Nez Perce Tribe. 2012. 2011 Idaho wolf monitoring progress report. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe Wolf Recovery Project, P.O. Box 365, Lapwai, Idaho. 94 pp.
- Ivan, J. 2011. Summary of Colorado Lynx in Montana. Spreadsheet from CDOW.
- Interagency Lynx Biology Team. 2013. Canada lynx conservation assessment and strategy. 3rd edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-13-19, Missoula, MT. 128 pp
- Lesica, P. and S. V. Cooper. 1997. Presettlement vegetation of southern Beaverhead County, Montana. Unpublished report to the State Office, Bureau of Land Management and Beaverhead-Deerlodge National Forest. Montana Natural Heritage Program, Helena, MT. 35 pp.
- Lenard, S., P. Hendricks, C. Currier and B. Maxell. 2005. Pygmy Rabbit Distribution in neaberhead and Madison Counties. Montana Natural Heritage Program. Montana State Library. Helena, Montana. Unpublished

- Mace, R. and L. Roberts. 2012. Northern Continental Divide Ecosystem Grizzly Bear Monitoring Team Annual Report, 2011. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.
- McKelvey, K.S., J.J. Claar, G.W. McDaniel, and G. Hanvey. 1999 National Lynx Detection Protocol. Rocky Mountain Research Station USDA Forest Service, Missoula MT 59801.
- McLellan, B.N., and F.W. Hovey. 2001. Natal dispersal of grizzly bears. Canadian Journal of Zoology 79:838-844.
- Montana Fish, Wildlife and Parks. 2006. Grizzly Bear Management Plan for Western Montana. Final Programmatic Environmental Impact Statement 2006-2016. Montana Fish, Wildlife and Parks. December 2006. Bozeman, Montana
- MTNHP. 2009. Montana Natural Heritage Program. Montana Field Guide. Pygmy Rabbit — *Brachylagus idahoensis*. Montana Field Guide. Retrieved on August 18, 2009, from http://FieldGuide.mt.gov/detail_AMAEB04010.aspx)
- MTNHP. 2013. Montana Natural Heritage Program. Species of Concern List. Accessed on December 17, 2013, http://mtnhp.org/SpeciesOfConcern/output/NHP_Animal_SOC_2013-12-17_09-07-22.pdf
- MTPIF. 2000. Partners in Flight. Bird Conservation Plan Montana. Version 1.1. April 2000. Montana Partners in Flight. American Bird Conservancy. Kalispell, Montana. Unpublished.
- MTSGWG. 2005. Management Plan and Conservation Strategies for Sage grouse in Montana. Helena:Montana Sage Grouse Work Group.
- National Agricultural Statistics Service. 2013. Beaverhead County Hay. http://www.nass.usda.gov/Quick_Stats/Lite/ Accessed 12/17/2013
- NatureServe Explorer – An Online encyclopedia of Life. Pygmy Rabbit account available at: <http://www.natureserve.org/explorer/> Accessed 12/17/2013
- Pers. Com. Boccadori. 2013. Email between Jenna Roose and MTFWP Biologist Vanna Boccadori. 2/6/2013
- Pers. Com. Fager. 2013. Email between Jenna Roose and MTFWP Biologist Craig Fager. 2/4/2013
- Pers. Com. Jonkel. 2012. Email between Jenna Casey and MTWFP Biologist Jamie Jonkel. 4/10/2012
- Pilgrim, K and M. Schwartz. 2013. Beaverhead-Deerlodge Forest Lynx (*Lynx canadensis*) Survey Samples and Results. USFS Rocky Mountain Research Station, February 22, 2013.
- Porco, M. 2009. Canada Lynx Surveys on the Beaverhead-Deerlodge National Forest, May 2009 – June 2009. Wild Things Unlimited.
- Profitt, K., M., J. A. Gude, K. L. Hamlin and M. A. Messer. 2013. Effects of Hunter Access and Habitat Security on Elk Habitat Selection in Landscapes with a Public and Private Land Matrix. The Journal of Wildlife Management. 77(3): 514-524
- Rauscher, Ryan. 1997. Status and distribution of the pygmy rabbit in Montana. Montana Department of Fish, Wildlife & Parks, non-game program. Unpublished report, 19 pp plus appendices.

- Rowland, M.M. M.J. Wisdom, B.K. Johnson and J.G. Kie. 2000. Elk Distribution and Modeling in Relation to Roads. *Journal of Wildlife Management*. 64(3): pgs 672-684
- Reudiger, B., J. Claar, S. Gniadek, B. Holt. L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.
- Stiver, S. J., Rinkes, E. T., & Naugle, D. E. (2010). Sage-grouse Habitat Assessment Framework. Boise, Idaho: U.S. Bureau of Land Management, Idaho State Office.
- Schwartz, C.C., S.D. Miller, and M.A. Haroldson. 2003b. Grizzly/brown bear. Pages 556-586 in G. Feldhamer, B. Thompson, and J. Chapman, editors. *Wild mammals of North America: biology, management, and conservation*. Johns Hopkins University Press, Baltimore, MD, USA
- Schwartz, C.C., M.A. Haroldson, K.A. Gunther, and D. Moody. 2006. Distribution of grizzly bears in the Greater Yellowstone Ecosystem in 2004. *Ursus* 17:63-66.
- Squires, J.R, T.J. Ulizio and L.F. Ruggerio. 2003. Carnivore Studies in the Pioneer Mountains and Adjacent Mountain Ranges of Southwest Montana. Final Report Dec 31, 2003. Rocky Mountain Research Station, Agreement No. 00-A-17-0031.
- Squires, J.R., N.J. Decesare, J.A. Kolbe and L.F. Ruggiero. 2010. Seasonal Resource Selection of Canada Lynx in Managed Forests of the Northern Rocky Mountains. *Journal of Wildlife Management*. 74(8): 1648-1660.
- Tidwell, T. 2009. Occupied and Unoccupied Lynx Habitat. Letter dated June 23, 2009. USDA Forest Service, Region 1, Missoula, MT.
- USDA FOREST SERVICE. 2002. Beaverhead -Deerlodge National Forest Noxious Weed Control. Final Environmental Impact Statement and Record of Decision.
- USDA FOREST SERVICE. 2004. MEMORANDUM OF UNDERSTANDING between USDA FOREST SERVICE and the USDA ANIMAL AND PLANT HEALTH INSPECTION SERVICE For WILDLIFE DAMAGE MANAGEMENT ACTIVITIES ON NATIONAL FOREST SYSTEM LANDS. FS Agreement No. 04-MU-11132422-061.
- USDA Forest Service. 2007. Northern Rockies Lynx Management Direction Record of Decision. USDA Forest Service, National Forests in Montana and parts of Idaho, Wyoming and Utah. 45 pp + references. Includes Figure 1-1 to FEIS showing linkage zones.
- USDA Forest Service. 2009a. Beaverhead-Deerlodge Forest Plan
- USDA Forest Service. 2009b. Appendix B, Biological Evaluation for the FEIS for the Beaverhead-Deerlodge Forest Plan.
- USDA Forest Service. 2009c. Beaverhead-Deerlodge National Forest Revised EIS for the Beaverhead-Deerlodge Forest Plan.
- USDA Forest Service. 2011a. Sensitive Species List. Region One. February 2011. Unpublished.

USDA Forest Service. 2012b. Conservation of Protection of Greater Sage Grouse and Its Habitat. Letter to Regional Foresters, R-1, R-2, and R-4. Washington, DC: USFS Washington Office.

USDA Forest Service. 2012c. INTERIM CONSERVATION RECOMMENDATIONS FOR GREATER SAGE-GROUSE AND GREATER SAGE-GROUSE HABITAT, USFS Regions 1, 2, and 4. Washington, DC: USFS Washington Office. Unpublished.

USDA Forest Service. 2013. Canada Lynx – Recent Information and Papers: A Review in Relation to the Northern Rockies Lynx Management Direction. September 19, 2013. Region 1 Regional Office. Missoula, MT. Unpublished.

USDA Forest Service and USDI Fish and Wildlife Service. 2008. Memorandum of Understanding between the USDA Forest Service and the US Fish and Wildlife Service to promote the conservation of migratory birds. FS Agreement #08-MU-1113-2400-264. Washington DC

USDI Fish and Wildlife Service. 1993. Grizzly Bear Recovery Plan. Missoula, MT USA. 181 pp.

USDI Fish and Wildlife Service. 2007. Biological Opinion on the Effects of the Northern Rockies Lynx Amendment on the Distinct Population Segment of Canada Lynx in the Contiguous United States. Unpublished. Montana Field Office, Helena Montana. 85 pp.

USDI Fish and Wildlife Service. 2008. Birds of Conservation Concern. U.S. Fish and Wildlife Service, Division of Migratory Bird Management. Arlington, Virginia. 26 pp.

USDI Fish and Wildlife Service. 2010a. 12-Month Finding on a Petition to List the Pygmy Rabbit as Endangered or Threatened. Federal Register September 30, 2010. Volume 75; Number 189; 60516-60561

USDI Fish and Wildlife Service. 2010b. 12-Month Finding on a Petition to List the North American Wolverine as Endangered or Threatened. Federal Register December 14, 2010. Volume 75; Number 239; 78029-78061.

USDI Fish and Wildlife Service. 2011. Grizzly Bear (*Ursus arctos horribilis*), 5 Year Review: Summary and Evaluation. August 2011. USDI Fish and Wildlife Service. Grizzly Bear Recovery Office. Missoula, Montana.

USDI Fish and Wildlife Service. 2013a. Endangered and Threatened Wildlife and Plants; Threatened Status for the Distinct Population Segment of the North American Wolverine Occurring in the Contiguous United States: Proposed rule. Federal Register February 4, 2013. Volume 78; Number 23; 7864-7890

USDI Fish and Wildlife Service. 2013b. Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. Denver, CO: US Fish and Wildlife Service.

USDI Fish and Wildlife Service. 2013c. Threatened, Endangered and Candidate Species for the Beaverhead-Deerlodge National Forest. 7/2/2013. Fish and Wildlife Service, Ecological Services, Montana Field Office, Helena, MT.

USDI Fish and Wildlife Service. 2013d. Endangered Species Act Section 7 Consultation Supplement to the Biological Opinion (2010) on the Effects of the 2009 Revision of the Beaverhead-Deerlodge National Forest Land and Resource Management Plan on Grizzly Bears Beaverhead-Deerlodge National Forest. Fish and Wildlife Service, Ecological Services, Montana Field Office, Helena, MT.

U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Utah Department of Natural Resources, and USDA Wildlife Services. 2012. Northern Rocky Mountain Wolf Recovery Program 2012 Interagency Annual Report. M.D. Jimenez and S.A. Becker, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana, 59601

van Manen, F. T., M. A. Haroldson and K. West, editors. 2012. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2011. U. S. Geological Survey, Bozeman, Montana, USA

WAFWA. (2008). Memorandum of Understanding among Western association of fish and wildlife agencies and U.S.D.A., Forest Service and U.S.D.I, Bureau of Land Management and U.S.D.I., Fish and Wildlife Service and U.S.D.I., Geological Survey and U.S.D.A. Natural Resources. Western Association of Fish and Wildlife Agencies.

Glossary

Social and Economic:

None at this time.

Heritage:

None at this time.

Recreation:

None at this time.

Scenery:

Color: The property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise indistinguishable objects. A hue (red, green, blue, yellow, and so on), as contrasted with a value (black, white, or gray).

Contrast: Diversity or distinction of adjacent parts. Effect of striking differences in form, line, color, or texture of a landscape.

Cultural Element: Attributes in a human-altered landscape; scenically positive cultural elements, most of which have historical backgrounds or nostalgic connotations. Examples include split-rail fences, stone walls, barns, orchards, hedgerows, and cabins.

Deviation: Departure from existing landscape character or from landscape character goals. Deviation from existing landscape character can be positive, negative, or have no effect.

Distance Zones: Landscape areas denoted by specified distances from the observer. Used as a frame of reference in which to discuss landscape attributes or the scenic effect of human activities in a landscape. See zones described below.

Immediate Foreground – The detailed feature landscape found within the first few hundred feet of the observer, generally, from the observer to 300 feet away. This distance zone is normally used in project level planning, not broad scale planning.

Foreground – Detailed landscape generally found from the observer to ½ mile away. See also immediate foreground.

Middleground – The zone between the foreground and the background in a landscape. The area located from ½ mile to 4 miles from the observer.

Background – The distant part of a landscape. The landscape area located from 4 miles to infinity from the viewer.

Expected: What constituents anticipate encountering in the national forests.

Expected Image: A mental picture that a person expects to see in a national forest.

Extent of Concern: The portion of a travel route for which a Scenic Concern Level has been assigned. The extent of concern for sites is not listed, but can be described as the perimeter of developed or heavily used areas. The extent of concern provides the general location for project analysis viewpoints and visibility mapping.

Form: Structure, mass, or shape of a landscape or of an object. Landscape form is often defined by edges or outlines of landforms, rockforms, vegetation patterns, or waterforms, or the enclosed spaces created by these attributes.

Landscape Character: Particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique.

Landscape Visibility: Accessibility of the landscape to viewers, referring to one's ability to see and perceive landscapes.

Natural Appearing Landscape Character: Landscape character resulting from human activities, yet appears natural, such as historic conversion of native forests into farmlands, pastures, and hedgerows that have reverted back to forests through reforestation activity or natural regeneration.

Scenery: General appearance of a place, general appearance of a landscape, or features of a landscape.

Scenery Management: The art and science of arranging, planning, and designing landscape attributes relative to the appearance of places and expanses in outdoor settings.

Scenic Attractiveness: The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rock form, water form, and vegetation pattern. Reflects varying visual perception attributes of variety, unity, vividness, intactness, coherence, mystery, uniqueness, harmony, balance, and pattern. Attractiveness is classified as: A) Distinctive, B) Typical or Common, C) Undistinguished.

Scenic Concern Level –Public value and importance of views. See Agricultural Handbook No. 701, Chapter 4 to further define concern levels and their use to map landscape visibility and establish Scenic Integrity Objectives. **Concern Level 1:** A travel route or site where use is high, and/or concern for the scenery is high. **Concern Level 2:** A travel route or site where use is low or moderate, and/or concern for the scenery is moderate.

Scenic Integrity: State of naturalness or, conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degree of deviation from the existing landscape character in a national forest as follows.

Very High – Generally provides for ecological change only.

High – Human activities are not visually evident. Activities may only repeat attributes of form, line, color, and texture found in the existing attributes, qualities or traits of a landscape that give it an image and make it identifiable or unique.

Moderate - Human activities must remain visually subordinate to the attributes of the existing landscape character. They may repeat form, line, color or texture common to these characters but changes in quality size, number intensity etc. must remain visually subordinate to the attributes, qualities or traits of a landscape that give it an image and make it identifiable or unique.

Low – Human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at background distances.

Scenic Quality: The essential attributes of landscape that when viewed by people, elicit psychological and physiological benefits to individuals and therefore, to society in general.

Scenic Resource: Attributes, characteristics, and features of landscapes that provide varying responses from and degrees of benefits to humans.

Viewshed: Total visible area from a single observer position, or the total visible area from multiple observer positions. Viewshed's are accumulated seen-areas from highways, trails, campgrounds, towns, cities, or other viewer locations. Examples are corridor, feature, or basin viewshed's.

Range and Invasive Plants:

- A -

Allotment (Grazing or Range): An area of land designated for the use of a certain number and kind of livestock for a prescribed period of time. It is the basic land unit used in the management of livestock on National Forest System lands and associated lands administered by the Forest Service.

Allotment Management Plan (AMP): A document applying to management of rangeland ecosystems and livestock operations on public lands prescribing: (1) the manner in and extent to which livestock operations will be conducted in order to meet ecosystems health, multiple use, economic, and other objectives; (2) describing range improvements to be installed and maintained; and (3) containing such other provisions relating to livestock grazing and other objectives found by the Secretary of Agriculture to be consistent with the provisions of the Federal Land Policy and Management Act. An AMP integrates resource objectives, standards, guidelines, and management requirements for soil and water for watershed protection, wildlife and fisheries, timber, and other resources on lands within a range allotment.

Allowable Use Level (AUL): A predetermined amount of current forage production that is to be removed and/or soil disturbance that is acceptable under a given set of circumstances in order to accelerate range improvement. Degree of use will vary depending upon range type, range condition and trend, season of use, and physiological needs of various plant species. Allowable use is also often defined as the degree of use estimated to be proper until proper use is known.

- C -

Canopy Cover: The percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included.

Climax Vegetation or Community: A final or steady-state plant community which is self-perpetuating and in dynamic equilibrium with its environment. It is the presumed end point in succession.

Cover Type: A taxonomic unit of vegetation classification referencing existing vegetation. Cover type is a broad taxon based on existing plant species that dominate, usually within the tallest layer. Examples include lodgepole pine, aspen, willow-sedge, sagebrush-grassland, etc.

- D -

Deferred Grazing: Grazing is deferred in one or more pastures to permit desired growth or regrowth of forage plants, or to produce ripe seeds prior to being grazed.

Desired Condition Status: The relative degree to which kinds, proportions, and amounts of vegetation in the present plant community resemble the desired plant community chosen for an ecological site.

- E -

Ecological Condition Status: The degree of similarity between the existing vegetation and existing soil conditions compared to the potential natural community and the desired soil condition on a site.

- F -

Forage: (n) Browse and herbage that is available and may provide food for grazing animals or be harvested for feeding.

Forb: Any herbaceous plant other than those in the Poaceae (grass), Cyperaceae (sedge), and Juncaceae (rush) families.

- G -

Grass: A member of the family Poaceae (Gramineae).

Grass-like Plant: A plant of the Cyperaceae (sedge) or Juncaceae (rush) families that vegetatively resembles a true grass of the Gramineae family.

Grassland: Lands on which the vegetation is dominated by grasses, grass-like plants, and/or forbs. These areas are typically free of trees, shrubs, or other woody vegetation.

Grazing System or Strategy: A specialization of grazing management that defines systematically recurring periods of grazing, deferment, or rest for one or more pastures or management units. Common grazing systems include deferred grazing, deferred-rotation grazing, and rest-rotation grazing.

Ground Cover: The percentage of material, other than bare ground, covering the soil surface. It may include vegetation (basal and canopy), litter, standing dead vegetation, gravel/rock, and a visible biological crust such as lichen and mosses. Ground cover plus bare ground will total 100 percent.

- H -

Habitat Type: A land area that supports, or has the potential of supporting, the same climax vegetation type. Each habitat type represents a relatively narrow segment of environmental variation having a certain potential for vegetation development. Therefore, habitat type is a vegetation-based ecological site classification that uses the plant community as an indicator of integrated environmental factors as they affect species reproduction and plant community development.

Head Month (HM): One month's use and occupancy of range by one weaned or adult cow, bull, steer, heifer, horse, burro, mule, or five sheep or goats.

- I -

Invasive Plant: Invasive plants include noxious weeds and other nonnative plants that have been introduced into an environment in which they did not evolve, and thus usually have no natural enemies to limit their reproduction and spread; and produce a significant change in terms of plant species composition, structure, or ecosystem function.

- K -

Key Species: Forage species whose use serves as an indicator to the degree of use of associated species. In many cases, key species include indicator species, and species traditionally referenced as decreaseers, increaseers, desirables, or intermediates.

- M -

Mesic: Characterized by, or adapted to a moist habitat.

Monitoring: The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives.

- N -

Noxious Weed: Noxious weeds as those plant species designated as noxious by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a

carrier or host of serious insects or disease, and being native or new to or not common to the United States or parts thereof.

- P -

Photo Point: A permanently identified point from which photographs are taken at periodic intervals.

Plant Community: An assemblage of plants living and interacting together in a specific location. No particular ecological status is inferred. Plant communities may include exotic or cultivated species.

- R -

Rangeland: All land producing, or capable of producing, native forage for grazing and browsing animals, and lands that have been revegetated naturally or artificially to provide a forage cover that is managed like native vegetation. It includes all grasslands, forblands, shrublands, and those forested lands which can --- continually or periodically, naturally or through management --- support an understory of herbaceous or shrubby vegetation that provides forage for grazing or browsing animals.

Rangeland Analysis: Systematic acquisition and evaluation of rangeland resources data needed for allotment management planning and overall land management.

Rangeland Condition: A generic term relating to present status of a unit of range in terms of specific values or potentials. Specific values or potentials must be stated. Also defined as the present state of vegetation of a range site in relation to the climax (natural potential) plant community for that site. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the climax plant community for the site (also see Ecological Condition).

Rangeland Health: The degree to which the integrity of the soil, vegetation, water, and air, as well as the ecological processes of the rangeland ecosystem are balanced and sustained.

Rest-rotation Grazing: This grazing strategy involves rotating livestock from one range area to another in order to prevent overgrazing. The rest rotation strategy is typically a multi-pasture design strategy that provides at least one year of rest for grazed pasture. This strategy is frequently combined with deferred, early, and late grazing techniques so that pastures are rested until seed ripe time, and rested for seedling establishment.

Riparian Area: The green zones bordering lakes, reservoirs, estuaries, potholes, springs and seeps, peatlands, wet meadows, vernal pools, and ephemeral, intermittent, or perennial streams. These zones are the interface or linkage between the upland (terrestrial) zone and the deep water (aquatic) zone.

- S -

Seral Stage: A classification used to depict a relative stage of plant community succession along a successional pathway, toward or away from a potential natural community. Examples include low seral, mid seral, and high seral.

Shrub: A plant with persistent, woody stems, relatively low growth habit, and generally several basal shoots instead of a single bole.

Shrubland: Land on which the vegetation is dominated by low-growing woody plants.

Species Composition: Proportions of various plant species in relation to the total on a given area. Proportions may be expressed in percentages based on canopy cover, frequency, weight, etc.

Succession: The process of vegetative and ecological development whereby an area becomes successively occupied by different plant communities.

- T -

Transect: A linear plot, usually represented by a line, along which are often placed regularly spaced quadrats (plot frames), loops, or other devices.

Trend: The direction of change in an attribute (e.g., species composition, ground cover, etc.) as observed over time. Trend is described as “toward” or “away” from the desired plant community, or as “static”.

- U -

Utilization: The available forage by weight consumed or trampled through livestock grazing, usually expressed as a percent.

- V -

Vegetation Type: A kind of existing plant community with distinguishable characteristics described in terms of present vegetation that dominates the aspect or physiognomy of the area. Examples include conifer, aspen, xeric shrubland, grassland, etc.

Vigor: The relative robustness of a plant in comparison to other individuals of the same species. It is reflected primarily by the size of a plant and its parts in relation to its age and the environment in which it is growing.

- X -

Xeric: Characterized by, or adapted to a dry habitat.

Sensitive Plants:

Candidate species – Candidate species are plants and animals for which the U.S. Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities (USDI Fish and Wildlife Service 2011b).

Endangered species – Any species in danger of extinction throughout all or a significant portion of its range. This does not include a species of the Class Insecta determined by the Secretary to be a pest whose protection under the provisions of the Endangered Species Act of 1973, as amended, would present an overwhelming and overriding risk to humans (FSM 2670.5)

Graminoid – A grass-like plant with narrow parallel veins in its leaves. Graminoids include species from the true grass family Poaceae, as well as the sedge (Cyperaceae) and rush (Juncacea) families.

Listed species – Any species of fish, wildlife, or plant officially designated as endangered or threatened by the Secretary of the Interior or Commerce. Listed species are documented in 50 CFR 17.11 and 17.12 (FSM 2670.5).

Nurse tree – A nurse tree is one that provides protection from the elements and assists other vegetation to establish.

Population - A collection of individuals of the same species who occupy a certain area and are capable of interbreeding.

Rhizome – an underground stem that sends out roots and shoots from its nodes. Plants with rhizomes often form mats of connected shoots, referred to as “**rhizomatous mats**” in this document.

Sensitive plants – A species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur on the Forest and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term on the Forest.

Threatened species – Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and that the appropriate Secretary has designated as a threatened species. (Some states also have declared certain species as threatened through their regulations or statutes) (FSM 2670.5).

Viable population - A population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species within the planning area.

VMap – VMap is a vegetation mapping program consisting of a geospatial database of existing vegetation (Brown and Barber 2011).

Soil:

None at this time.

Hydrology:

None at this time

Aquatics:

Aquatic Nuisance Species: non-indigenous plant or animal species that threaten the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, aqua-cultural, or recreational activities dependent on such waters.

INFISH- Inland native fish strategy. This strategy was developed to provide interim direction to protect habitat and populations of native resident fish until longer-term conservation strategies such as the Upper Columbia River Basin and federal recovery plans replaced it.

Key Watershed: One or both of the following types of watershed designations
Fish Key Watersheds: Watersheds selected for focusing of federal funds and personnel for the purpose of protecting, restoring, or maintaining viability of Threatened, Endangered and Sensitive aquatic species.

Restoration Key Watersheds: Watersheds selected for focusing of federal funds and personnel for the purpose of accelerating improvements in water quality and watershed conditions.

Properly Functioning Condition (PFC): Ecosystems are in PFC when they function within their historic range of variability.

Redd: an excavated “nest” of developing salmonid eggs and embryos placed in the substrate of the stream

Riparian Conservation Area (RCA): As established by the Inland Native Fish Strategy, RCAs are portions of watersheds where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. Examples include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems. The following categories describe RCAs unless developed and documented through a watershed or site specific analysis.

Category 1 – Fish bearing streams: RCAs consist of the stream and the area on either side of the stream extending from the edge of the active channel to the top of the inner gorge, or to the outer edges of the 100 year floodplain, or to the outer edge of the riparian vegetation, or to the a distance equal to the height of two site potential trees, or 300 feet slope distance (600 feet including both sides of the stream channel), whichever is greatest.

Category 2 – Permanently flowing non-fish bearing streams: RCAs consist of the stream and the area on either side of the stream extending from the edge of the active channel to the top of the inner gorge, or to the outer edges of the 100 year floodplain, or to the outer edge of the riparian vegetation, or to the a distance equal to the height of one site-potential trees, or 150 feet slope distance (300 feet including both sides of the stream channel), whichever is greatest.

Category 3 - Ponds, lakes, reservoirs, and wetlands greater than 1 acre: RCAs consist of the body of water or wetland and the area to the outer, edges of the riparian vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to the a distance equal to the height of one site-potential trees, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond, or lake, whichever is greatest.

Category 4 - Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide-prone areas: This category includes features with high variability in size and site-specific characteristics. At a minimum the RCAs must include:

- a. The extent of landslides and landslide-prone areas,
- b. The intermittent stream channel and the area to the top of the inner gorge,
- c. The intermittent stream channel or wetland and the area to the outer edge of the riparian vegetation,
- d. For Fish Conservation Watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.
- e. For watersheds not identified as Fish Key Watersheds, the area from the edges of the stream channel, wetland, landslide, landslide-prone area to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greatest.

Riparian Management Objective (RMO): Fish habitat objectives established for habitat attributes such as pool frequency, large woody debris, bank stability, bank angle, entrenchment ratio, fine sediment levels, water temperature, and width-to-depth ratio to achieve properly functioning condition in streams.

Wildlife:

1 Areas of consistent snow compaction – An area of consistent snow compaction is an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. Areas of consistent snow compaction will be determined based on the area or miles used in 1998 to 2000.

2 Broad scale assessment – A broad scale assessment is a synthesis of current scientific knowledge, including a description of uncertainties and assumptions, to provide an understanding of past and present conditions and future trends, and a characterization of the ecological, social and economic components of an area. (LCAS)

3 Carr – Deciduous woodland or shrub land occurring on permanently wet, organic soil. (LCAS)

4 Course woody debris – Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses on the ground or in streams. (LCAS)

5 Daylight thinning – Daylight thinning is a form of precommercial thinning that removes the trees and brush inside a given radius around a tree.

6 Denning habitat (lynx) – Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Denning habitat must be within daily travel distance of winter snowshoe hare habitat – the typical maximum daily distance for females is about three to six miles. Denning habitat includes mature and old growth²⁴ forests with plenty of coarse woody debris. It can also include young regenerating forests with piles of coarse woody debris, or areas where down trees are jack-strawed.

7 Designated over-the-snow routes – Designated over-the-snow routes are routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps) or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes also are designated by definition. The determination of baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted or encouraged in 1998 to 2000.

8 Designated route – A designated route is a road or trail that has been identified as open for specified travel use.

9 Developed recreation – Developed recreation requires facilities that result in concentrated use. For example, skiing requires lifts, parking lots, buildings and roads; campgrounds require roads, picnic tables and toilet facilities.

10 Security habitat (lynx) – Security habitat amounts to places in lynx habitat that provide secure winter bedding sites for lynx in highly disturbed landscapes like ski areas. Security habitat gives lynx the ability to retreat from human disturbance. Forest structures that make human access difficult generally discourage human activity in security habitats. Security habitats are most effective if big enough to provide visual and acoustic insulation and to let lynx easily move away from any intrusion. They must be close to winter snowshoe hare habitat. (LCAS)

11 Fire use – Fire use is the combination of wildland fire use and using prescribed fire to meet resource objectives. (NIFC) Wildland fire use is the management of naturally ignited wildland fires to accomplish resource management objectives in areas that have a fire management plan. The use of the term wildland fire use replaces the term prescribed natural fire. (Wildland and Prescribed Fire Management Policy, August 1998)

12 Forest highway – A forest highway is a forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23, Section 101(a)), designated by an agreement with the FS, state transportation agency and Federal Highway Administration.

13 Fuel treatment – A fuel treatment is a management action that reduces the threat of ignition and fire intensity or rate of spread, or is used to restore fire-adapted ecosystems.

14 Goal – A goal is a broad description of what an agency is trying to achieve, found in a land management plan. (LCAS)

15 Guideline – A guideline is a particular management action that should be used to meet an objective found in a land management plan. The rationale for deviations may be documented, but amending the plan is not required. (LCAS modified)

16 Habitat connectivity (lynx) – Habitat connectivity consists of an adequate amount of vegetation cover arranged in a way that allows lynx to move around. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian areas may provide travel cover across open valley floors. (LCAS)

17 HFRA (Healthy Forests Restoration Act) - Public Law 108-148, passed in December 2003. The HFRA provides statutory processes for hazardous fuel reduction projects on certain types of at-risk National Forest System and Bureau of Land Management lands. It also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on lands of all ownerships. (Modified from Forest Service HFRA web site.)

18 Highway – The word highway includes all roads that are part of the National Highway System. (23 CFR 470.107(b))

19 Horizontal cover – Horizontal cover is the visual obscuring or cover provided by habitat structures that extend to the ground or snow surface primarily provided by tree stems and tree boughs, but also includes herbaceous vegetation, snow, and landscape topography. Horizontal cover was measured by John Squires et al. (pers. com.) in Northwestern Montana according to the following methodology:

“A canvas cover-board (2 m x 0.5 m) was erected 10 m from plot center in 4 directions (forward track, back track, and at 2, 90° angles) was read to directly measure horizontal cover. The cover board was divided into 4, 0.5 meter blocks and each block was further divided into quarters. At each reading, technicians estimated horizontal cover by 10% class at each of the 4 heights; these 4 estimates were then averaged for an overall estimate of that reading.” (According to Squires via pers. com., cover measured during the summer period averaged approximately 65% while at den sites it was measured at roughly 85%. During the winter period cover was measured at 45% while at winter kill sites it was slightly greater than 50%.)

20 Isolated mountain range – Isolated mountain ranges are small mountains cut off from other mountains and surrounded by flatlands. On the east side of the Rockies, they are used for analysis instead of sub-basins. Examples are the Little Belts in Montana and the Bighorns in Wyoming.

21 LAU (Lynx Analysis Unit) – An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 square miles (LCAS). An LAU is a unit for which the effects of a project would be analyzed; its boundaries should remain constant.

22 Linkage area – A linkage area provides connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where basins, valleys or agricultural lands separate blocks of lynx habitat, or where lynx habitat naturally narrows between blocks. (LCAS updated definition approved by the Steering Committee 10/23/01)

23 Lynx habitat – Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the northern Rockies, lynx habitat generally occurs between 3,500 and 8,000 feet of elevation, and primarily consists of lodgepole pine, subalpine fir and Engelmann spruce. It may consist of cedar-hemlock in extreme northern Idaho, northeastern Washington and northwestern Montana, or of Douglas fir on moist sites at higher elevations in central Idaho. It may also consist of cool, moist Douglas fir, grand fir, western larch and aspen when interspersed in subalpine forests. Dry forests do not provide lynx habitat. (LCAS)

24 Lynx habitat in an unsuitable condition –Lynx habitat in an unsuitable condition consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and have not grown tall enough to protrude above the snow during winter. Stand replacing fire or certain vegetation management projects can create unsuitable conditions. Vegetation management projects that can result in unsuitable habitat include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure. (LCAS)

25 Low-speed, low-traffic-volume road – Low speed is less than 20 miles per hour; low volume is a seasonal average daily traffic load of less than 100 vehicles per day.

26 Maintain – In the context of this amendment, maintain means to provide enough lynx habitat to conserve lynx. It does not mean to keep the status quo.

27 Maintenance level – Maintenance levels define the level of service provided by and maintenance required for a road. (FSH 7709.58, Sec 12.3) Maintenance level 4 is assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most level 4 roads have double lanes and aggregate surfaced. Some may be single lane; some may be paved or have dust abated. Maintenance level 5 is assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane and paved, but some may be aggregate surfaced with the dust abated.

28 Mid-seral or later – Mid-seral is the successional stage in a plant community that's the midpoint as it moves from bare ground to climax. For riparian areas, it means willows or other shrubs have become established. For shrub-steppe areas, it means shrubs associated with climax are present and increasing in density.

29 Multi-story mature or late successional forest – This stage is similar to the old multistory structural stage (see below). However, trees are generally not as old and decaying trees may be somewhat less abundant.

30 Objective – An objective is a statement in a land management plan describing desired resource conditions and intended to promote achieving programmatic goals. (LCAS)

31 Old multistory structural stage – Many age classes and vegetation layers mark the old forest, multistoried stage. It usually contains large old trees. Decaying fallen trees may be present that leave a discontinuous overstory canopy. On cold or moist sites without frequent fires or other disturbance, multi-layer stands with large trees in the uppermost layer develop. (Oliver and Larson, 1996)

32 Old growth – Old growth forests generally contain trees that are large for their species and site, and are sometimes decadent with broken tops. Old growth often contains a variety of tree sizes, large snags and logs, and a developed and often patchy understory.

33 Permanent development – A permanent development is any development that results in a loss of lynx habitat for at least 15 years. Ski trails, parking lots, new permanent roads, structures, campgrounds and many special use developments would be considered permanent developments.

34 Prescribed fire – A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements met, before ignition. The term replaces management ignited prescribed fire. (NWCG)

35 Precommercial thinning – Precommercial thinning is mechanically removing trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return. (Dictionary of Forestry)

36 Red squirrel habitat – Red squirrel habitat consists of coniferous forests of seed and cone-producing age that usually contain snags and downed woody debris, generally associated with mature or older forests.

37 Regeneration harvest – The cutting of trees and creating an entire new age class; an even-age harvest. The major methods are clearcutting, seed tree, shelterwood, and group selective cuts (Helms 1998).

38 Research – Research consists of studies conducted to increase scientific knowledge or technology. For the purposes of Standards VEG S5 and VEG S6, research applies to studies financed from the forest research budget (FSM 4040) and administrative studies financed from the NF budget.

39 Restore, restoration – To restore is to return or re-establish ecosystems or habitats to their original structure and species composition. (Dictionary of Forestry)

40 Riparian area – An area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation. (LCAS)

41 Salvage harvest – Salvage harvest is a commercial timber sale of dead, damaged or dying trees. It recovers economic value that would otherwise be lost. Collecting firewood for personal use is not considered salvage harvest.

42 Shrub steppe habitat – Shrub steppe habitat consists of dry sites with shrubs and grasslands intermingled.

43 Standard – A standard is a required action in a land management plan specifying how to achieve an objective or under what circumstances to refrain from taking action. A plan must be amended to deviate from a standard.

44 Stand initiation structural stage – The stand initiation stage generally develops after a stand-replacing disturbance by fire or regeneration timber harvest. A new single-story layer of shrubs, tree seedlings and saplings establish and develop, reoccupying the site. Trees that need full sun are likely to dominate these even-aged stands. (Oliver and Larson, 1996)

45 Stem exclusion structural stage – In the stem exclusion stage, trees initially grow fast and quickly occupy all of the growing space, creating a closed canopy. Because the trees are tall, little light reaches the forest floor so understory plants (including smaller trees) are shaded and grow more slowly. Species that need full sunlight usually die; shrubs and herbs may become dormant. New trees are precluded by a lack of sunlight or moisture. (Oliver and Larson, 1996)

46 Timber management – Timber management consists of growing, tending, commercially harvesting and regenerating crops of trees.

47 Understory re-initiation structural stage – In the understory re-initiation stage, a new age class of trees gets established after overstory trees begin to die, are removed or no longer fully occupy their growing space after tall trees abrade each other in the wind. Understory seedlings then re-grow and the trees begin to stratify into vertical layers. A low to moderately dense uneven-aged overstory develops, with some small shade-tolerant trees in the understory. (Oliver and Larson, 1996)

48 Vegetation management projects – Vegetation management projects change the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire and timber harvest. For the purposes of this amendment, the term does not include removing vegetation for permanent

developments like mineral operations, ski runs, roads and the like, and does not apply to fire suppression or to wildland fire use.

49 Wildland urban interface (WUI) - The area adjacent to an at-risk community that is identified in the community wildfire protection plan. If there is no community wildfire protection plan in place, the WUI is the area 0.5 mile from the boundary of an at-risk community or within 1.5 miles of the boundary of an at-risk community. The WUI could also include areas if the terrain is steep, or there is a nearby road or ridge top that could be incorporated into a fuel break, or the land is in condition class 3, or the area contains an emergency exit route needed for safe evacuations. (Condensed from HFRA. For full text see HFRA § 101.)

50 Winter snowshoe hare habitat – Winter snowshoe hare habitat consists of places where young trees or shrubs grow dense – thousands of woody stems per acre – and tall enough to protrude above the snow during winter, so hares can browse on the bark and small twigs (Ruediger et al. 2000). Winter snowshoe hare habitat develops primarily in the stand initiation, understory reinitiation and old forest multistoried structural stage.

Chapter 5 – Appendix's

See the DEIS separate folder titled DEIS Appendix's. See detail list of items included in each appendix below.

Appendix A Project Maps

Appendix A1- Alternative Maps
Appendix A2 – Recreation Maps
Appendix A3 – Range/Invasive Plants Maps
Appendix A4 – Soil Maps
Appendix A5 – Hydrology Maps
Appendix A6 Aquatic Maps
Appendix A7 Wildlife Maps
Appendix A8 Past Activity Maps
Appendix A9 Scenery Maps

Appendix B Project Tables

Appendix B1 – Project Area Tables
Appendix B2 - Recreation Tables
Appendix B3 – Range/Invasive Plants Tables
Appendix B4 – Sensitive Plants Tables
Appendix B5 – Soil Tables
Appendix B6 – Hydrology Tables
Appendix B7 - Aquatic Tables
Appendix B8 – Wildlife Tables

Appendix C Scoping Comments

Appendix D Forest Plan Consistency